

EDIBLE FRUITS OF SOLANUM
IN COLOMBIA

BY
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AND
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ONE of the largest and most interesting plant families in tropical South America is the Solanaceae. The world has acquired from this continent a number of solanaceous economic plants of outstanding value, such as *Lycopersicon esculentum* Mill. (tomato); *Cyphomandra betacea* (Cav.) Sendt. (tree tomato); *Nicotiana Tabacum* L. (tobacco); *Solanum tuberosum* L. (potato); and sundry narcotics. There are, however, other species of lesser economic importance, grown locally, which have never been extensively adopted by peoples in other regions. This family, especially as it is represented in the Andes, merits much closer taxonomic and agronomic investigation. It is well within the realm of probability that new food or drug plants will be found when such a concerted study is pursued.

The genus *Solanum* contains some of the most poisonous members of the family, yet a few of the species yield edible berries which are utilized by the local inhabitants as fruits or as the source of refreshing and probably

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vitamine-rich beverages. Our information on these edible species of *Solanum* is sparse, and, in some cases, its reliability is suspect. This is due primarily to the difficulty of precise identification of collections of *Solanum*, one of the largest genera of plants and one which, like many others in the family, suffers woefully from lack of modern taxonomic revision. There are undoubtedly an appreciable number of new species in the genus, in spite of the many concepts already described, and it appears that perhaps some of the species locally cultivated as economic plants fall into this category.

The present paper is offered as a preliminary summary of our knowledge of Colombian species of *Solanum* cultivated for their edible fruits. Much of the information contained in this summary has resulted from the field investigations of the authors and their botanical colleagues. It continues partial studies by both of the authors in previous articles and in a book: Schultes, R. E. and J. Cuatrecasas: "Notes on the cultivated lulo" in *Bot. Mus. Leafl., Harvard Univ.* 16 (1953) 97; Schultes, R. E.: "A little known cultivated plant from northern South America" *ibid.* 18 (1958) 229; and Romero-Castañeda, R.: "Frutas silvestres de Colombia" 1 (1961) 282-292. We have not felt constrained to include literature references to *Solanum* species with edible fruit without seeing voucher specimens ourselves. There remains open, obviously, an extensive field for future studies of this subject along both academic and practical lines of research. We hope that this brief contribution may stimulate studies of such a nature.

***Solanum alibile* R. E. Schultes sp. nov.**

Frutex usque ad quattuor ped. altus, robustior, scandens. Rami robusti, teretes, lepidoto-pubescentes, cortice brunneo. Ramuli densissime albo-stellato-tomen-

tos. Folia grossiuscule membranacea, circiter ovata vel irregulariter elliptica, usque ad 50 cm. longa, 38–40 cm. lata (probabiliter majora), basi inaequaliter truncata, apice abrupte acuminata vel subacuta, margine distantissime et profundissime sinuata, valde petiolata (petiolis usque ad 9 cm. longis, densissime albo-stellato-tomentosis), supra dense albido-sericea, infra regulariter albido-stellata; venis omnino stellatis. Inflorescentiae cymosae, laterales, breviter pedunculatae, pauciflorae. Flores pedicellati usque ad 1 cm. longi, 3 mm. in diametro, densissime molliterque stellato-pilosi. Calycis lobi aliquid crassulentes, triangulari-ovati, acuti, usque ad 12 mm. longi, extus maxime densissime molliterque albido-stellati, intus subglabri sed minute lepidote, fructu persistentes. Corolla valde membranacea, lobis albido-viridibus, oblongis, usque ad 18 mm. longis, 6 mm. latis, intus subglabris, extus dense stellato-pilosis. Anthera flava, erecta, plusminusve 8 mm. longa. Stylus teres, 5 mm. longus. Ovarium globosum, dense albido-sericeum, 2.5 mm. in diametro. Fructus globosus vel subglobosus, 9–9.5 cm. in diametro, maturitate rufescens, dense minuteque stellato-tomentulosus: indumento faciliter caduco, maturitate subglabrescens. Pulpa acidulosa. Semina numerosissima, compressa, in circiter ovalia, 2–3 mm. longa, plusminusve 1.8–2 mm. lata, straminea.

COLOMBIA: Comisaría del Putumayo, Río Putumayo, Puerto Asís, altitude about 200 m. "Fruit orange-red. Size of very large orange, covered with caducous hairs. Leaves and petioles spineless. Shrub 3–4 feet tall. Cultivated. *Lulo*." August 2, 1960, *Richard Evans Schultes 22571* (TYPE in Econ. Herb. Oakes Ames; DUPLICATE TYPE in Herb. Nac. Col.).

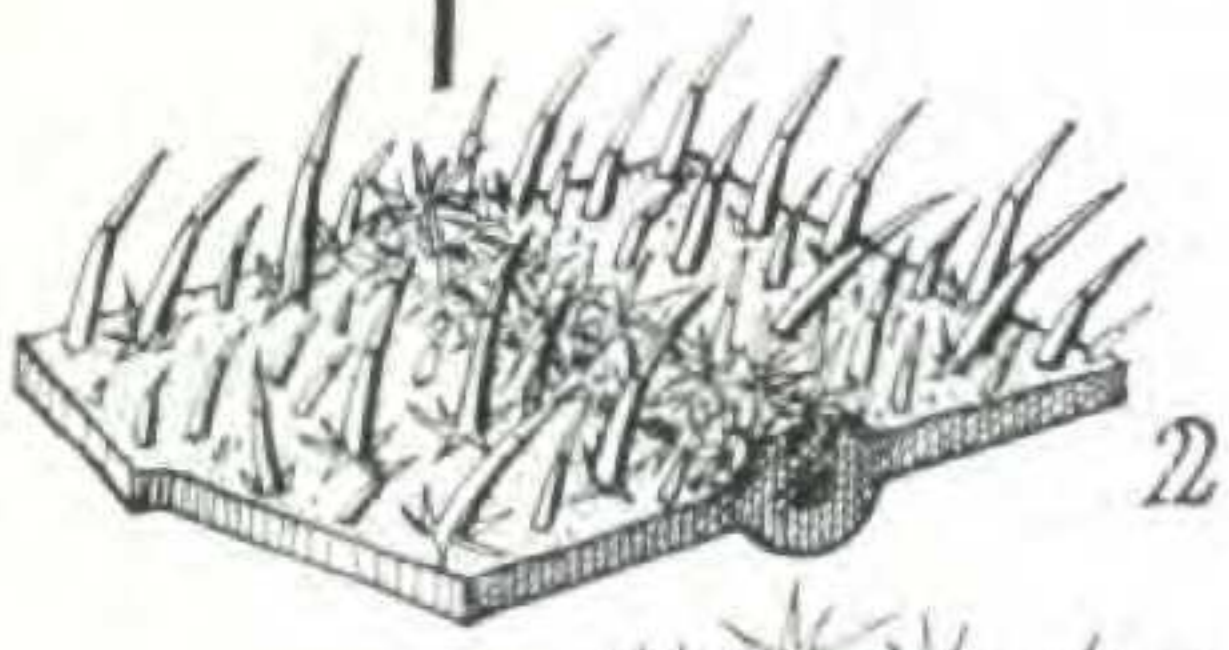
Solanum alibile, so named because of its extensive local use as a fruit and source of a refreshing beverage, is closely related to *S. Topiro*. More extensive field or monographic work might indicate that it should be accorded only varietal rank. The inhabitants readily distinguish

EXPLANATION OF THE ILLUSTRATION

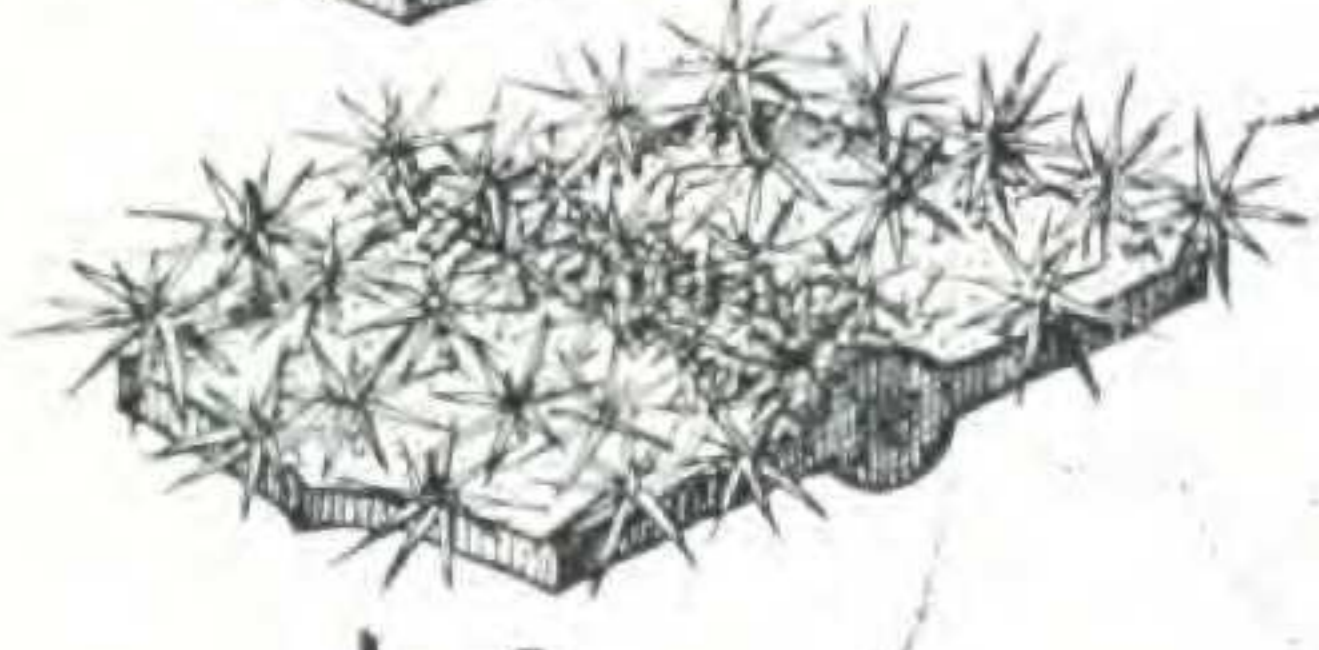
PLATE XXXII. SOLANUM ALIBILE *R. E. Schultes*. 1, leaf, approximately one half natural size. 2, portion of upper surface of leaf, greatly enlarged. 3, portion of nether surface of leaf, greatly enlarged. 4, young leaves and buds, approximately one half natural size. 5, fruit, one half natural size. 6, flower, approximately one half natural size.

Drawn by ELMER W. SMITH

SOLANUM
alibile
R.E. Schultes



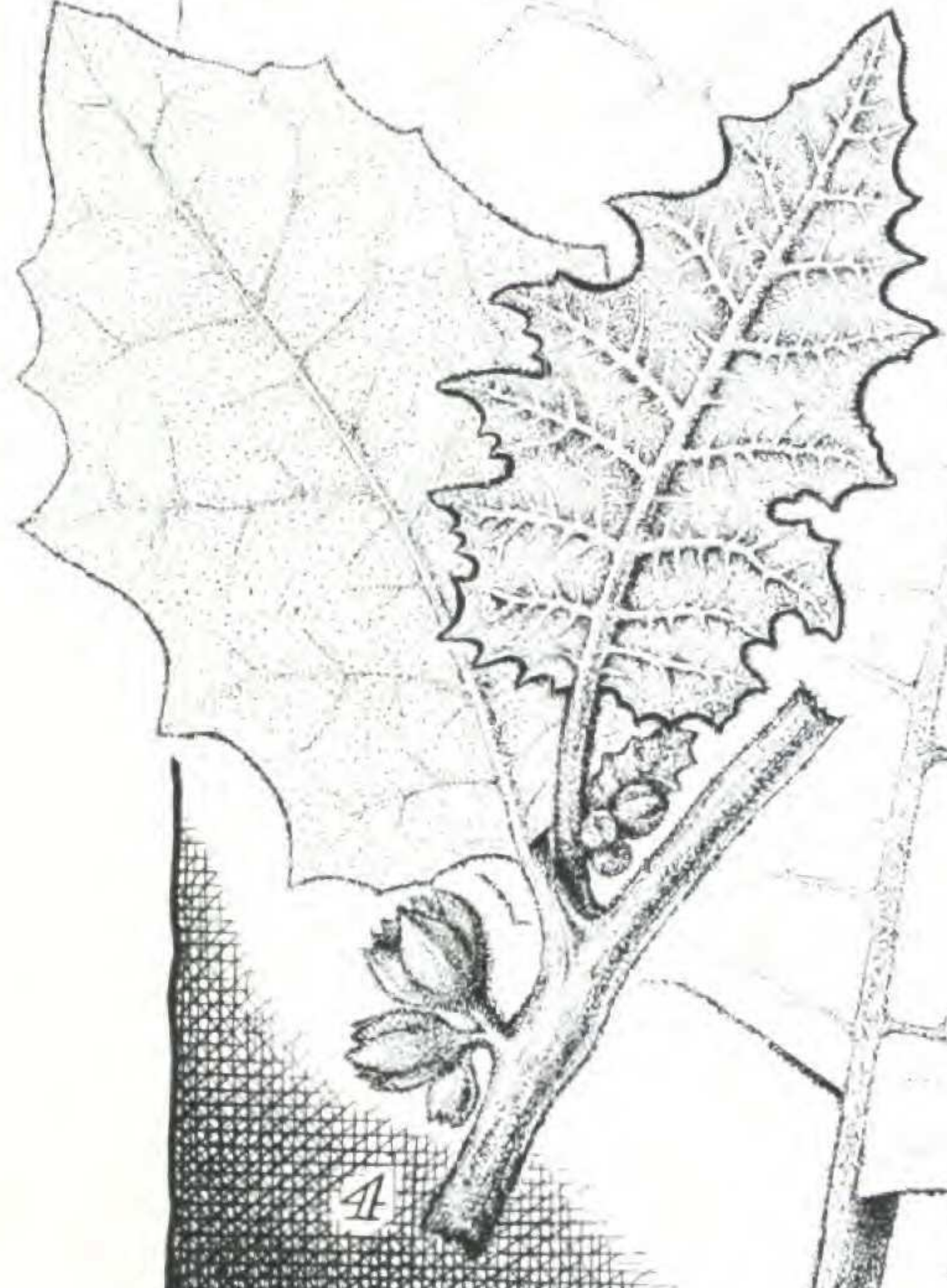
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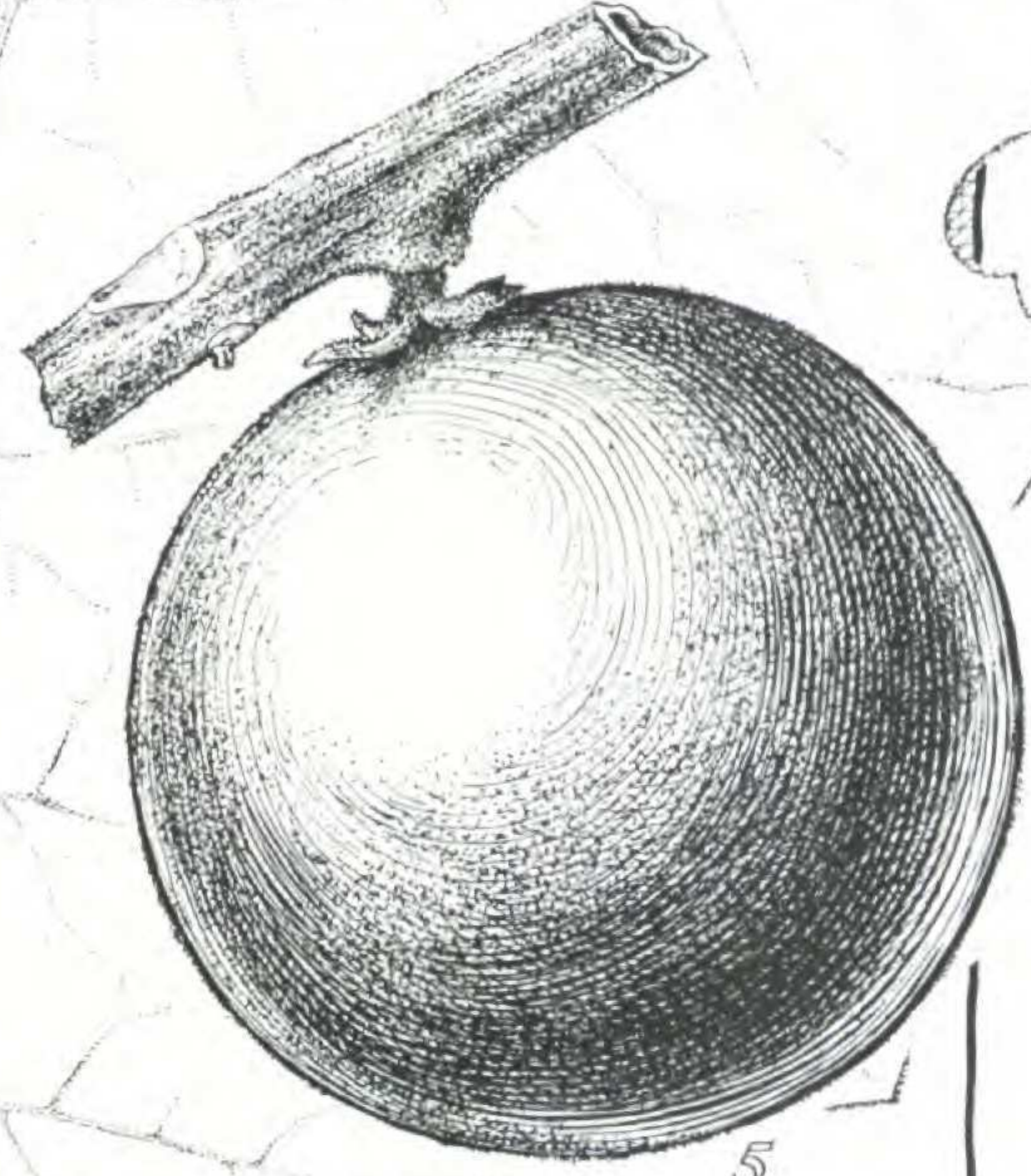
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E.W. Smith

the two, however, and state that the fruits of *Solanum alibile* are less acidulous than are those of *S. Topiro*.

The fruit of *Solanum alibile* is normally perfectly globose (instead of being ovoid) and more than twice as large (9–9.5 cm. instead of 4.5 cm. in diameter) than those of *S. Topiro*. There are, likewise, significant differences in the form and coloration of the indument of the leaves and floral segments.

Solanum alibile and its fruits are called *lulo* by the inhabitants of the Comisaría del Putumayo, most of whom are recent settlers from the more populous parts of Colombia where, in the highland areas, this vernacular name applies to *S. quitoense*.

***Solanum georgicum* R. E. Schultes sp. nov.**

Frutex usque ad quattuor ped. altus, robustior, erectus. Rami robusti, teretes, dense albido-stellati, cortice griselli, partibus omnibus spinis armati. Ramuli similes. Folia grossiuscule membranacea, circiter ovata vel irregulariter lateque elliptica, lamina usque ad 35 cm. longa, 28 cm. lata, basi inaequaliter truncata, apice abrupte acuminata vel subacuta, margine distante profundeque sinuata, valde petiolata (petiolis usque ad 5 cm. longis, maxime densissime albido-stellatis), supra dense regulariterque albido-sericea, infra dense albido-stellata (statu juvenile aureo-sericea), venis utroque latere stellatis et spinis stramineis sed basi fuscis, usque ad 15 mm. conspicue armatis. Inflorescentiae cymosae, laterales, breviter pedunculatae, pauciflorae. Flores pedicellati; pedicelli usque ad 6–7 mm. longi, dense stellati. Calycis lobi aliquid crassulentes, triangulari-ovati, valde acuti, leviter marginati, usque ad 10 mm. longi, extus densissime molliterque albido-stellati, intus dense albido-lepidoto; fructu persistentes. Corolla valde membranacea; lobis albido-viridibus, oblongis, subacutis, usque ad

12 mm. longis, 5–7 mm. latis, intus glabris, extus dense stellato-pilosis. Anthera flava, erecta, plusminusve 9 mm. longa. Stylus teres, 4–5 mm. longus. Ovarium globosum, dense et longe albido-sericeum, 2.5–3 mm. in diametro. Fructus perfecte globosus, plerumque 4.5 cm. in diametro, maturitate rufescens, dense minuteque tomentosus, indumento faciliter caduco, maturitate subglabrescens. Pulpa aliquid acidulosa. Semina numerosissima, compressa, in circuitu ovalia, plusminusve 2.5 mm. longa, 2 mm. lata, straminea.

COLOMBIA: Comisaría del Putumayo, between Pepino and Mocoa, altitude about 700 m. "Cultivated. Flowers greenish white. Leaves very spiny. Height 2–4 ft. Fruit globose, ripening dark red, covered with caducous hairs. *Naranjilla*." July 28, 1960, *Richard Evans Schultes 22554* (TYPE in Econ. Herb. Oakes Ames; DUPLICATE TYPE in Herb. Nac. Col.).—Comisaría del Putumayo, Río Putumayo, Puerto Asís, altitude about 200 m. "Shrub 2–3 feet tall. Fruit orange-red, small. Leaves spiny." August 2, 1960, *R. E. Schultes 22573*.

This new species is allied to *Solanum Topiro*, but it is distinguished by the inhabitants of the region who apply different common names to the two plants. *Solanum Topiro*, which is not found in the Comisaría del Putumayo as high as 700 meters, is called *cocona*, whereas *S. georgicum* is known as *naranjilla*, the term which, in the southern Colombian Andes, refers to *S. quitoense*. The inhabitants of the Putumayo are quick to point out two other important differences: *S. georgicum* is conspicuously spiny on the stems and along the nerves of the leaves and has perfectly globose fruits, whereas *S. Topiro* is unarmed and usually has ovoid fruits.

The berry of *Solanum georgicum* is eaten directly as a fruit and is employed in the preparation of a refreshing, acidulous beverage. The plant is cultivated, but in a haphazard way, growing up along roadsides and on the edge of agricultural plots (whence its specific epithet) without special care. It appears to be a wild species which has

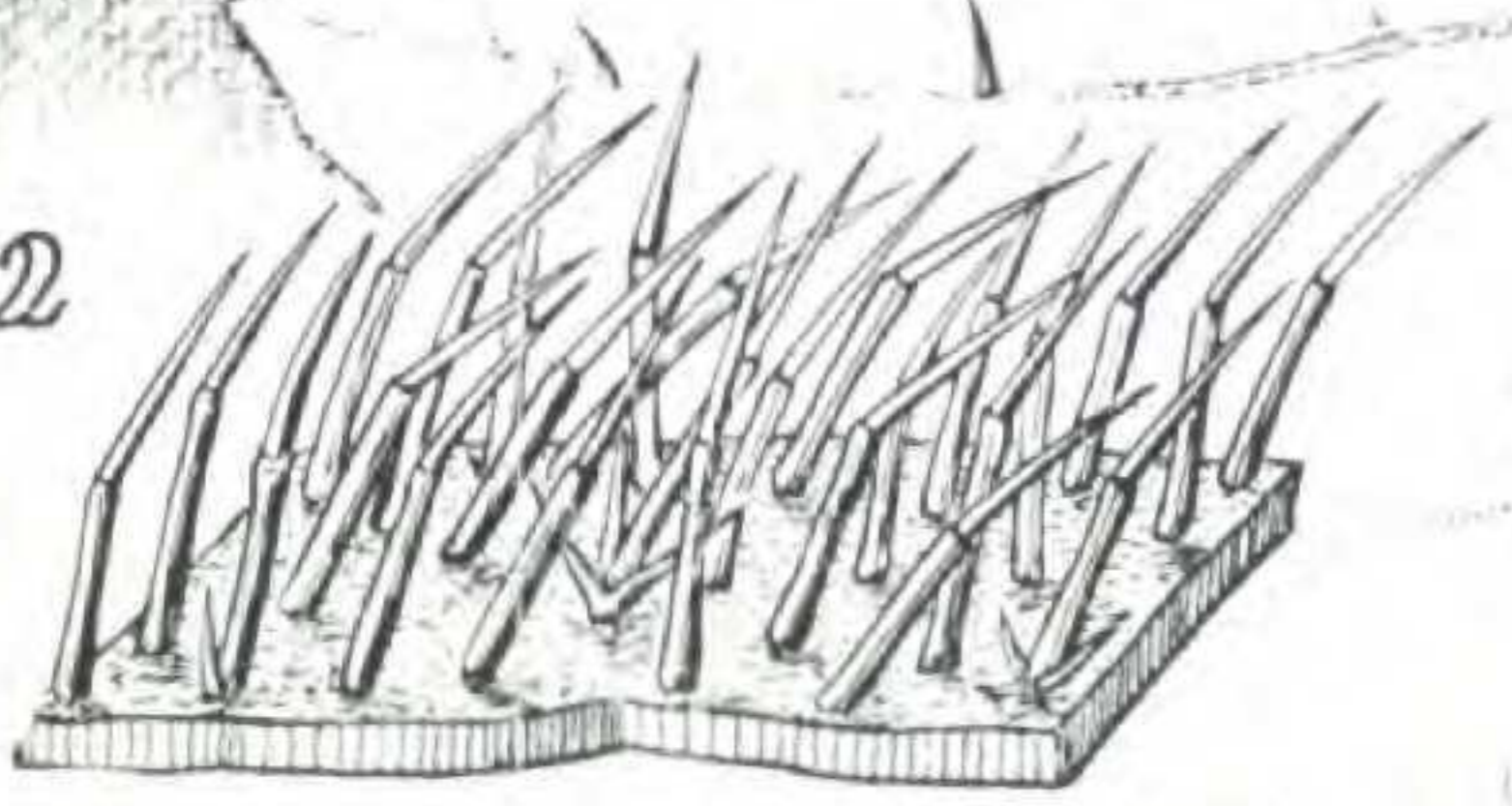
EXPLANATION OF THE ILLUSTRATION

PLATE XXXIII. *SOLANUM GEORGICUM* *R. E. Schultes*.
1, leaves and buds, approximately one half natural size. 2, portion of upper surface of leaf, greatly enlarged. 3, portion of nether surface of leaf, greatly enlarged. 4, flower, approximately one half natural size. 5, fruiting branch, approximately one half natural size.

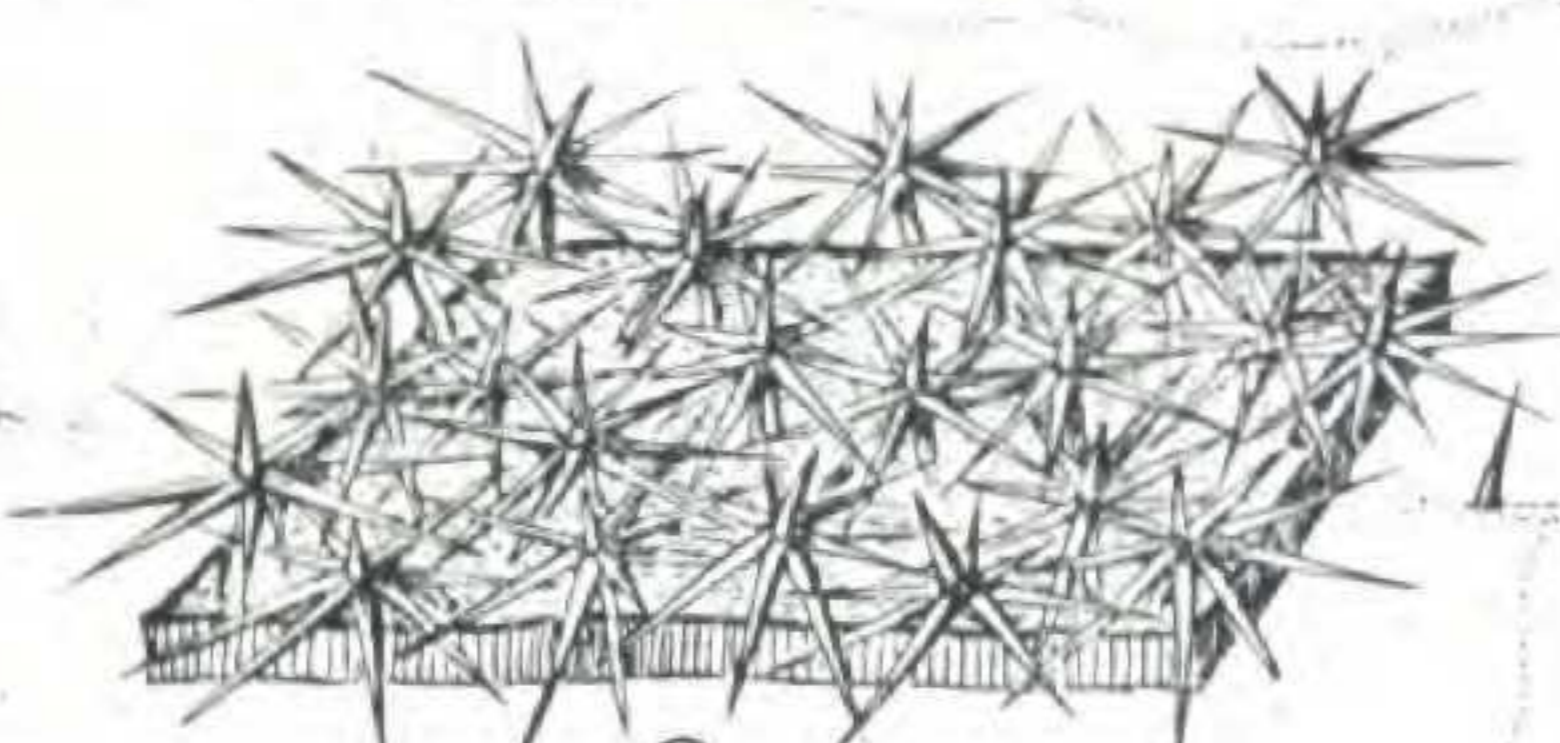
Drawn by ELMER W. SMITH

SOLANUM
georgicum
R. E. Schultes

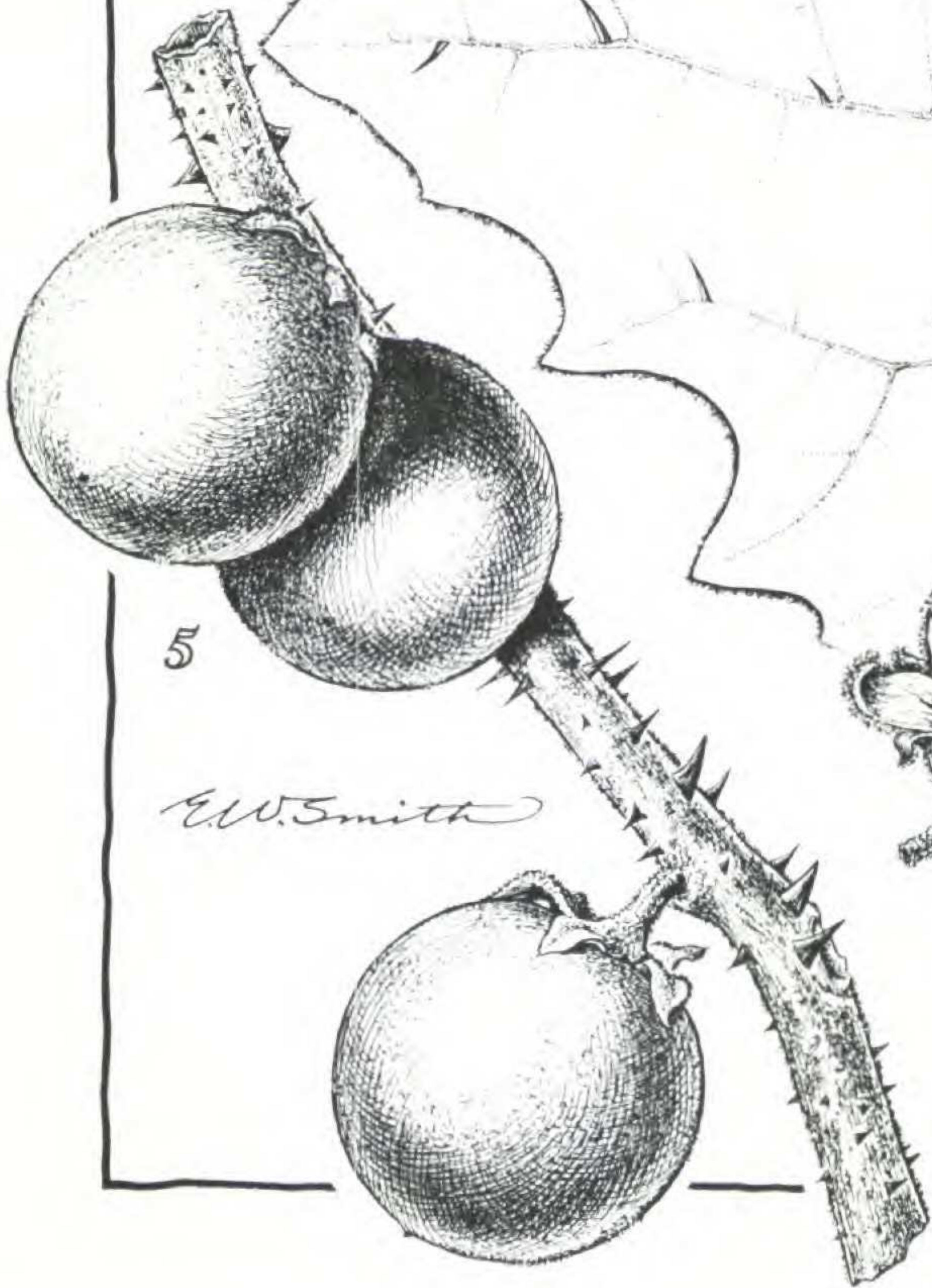
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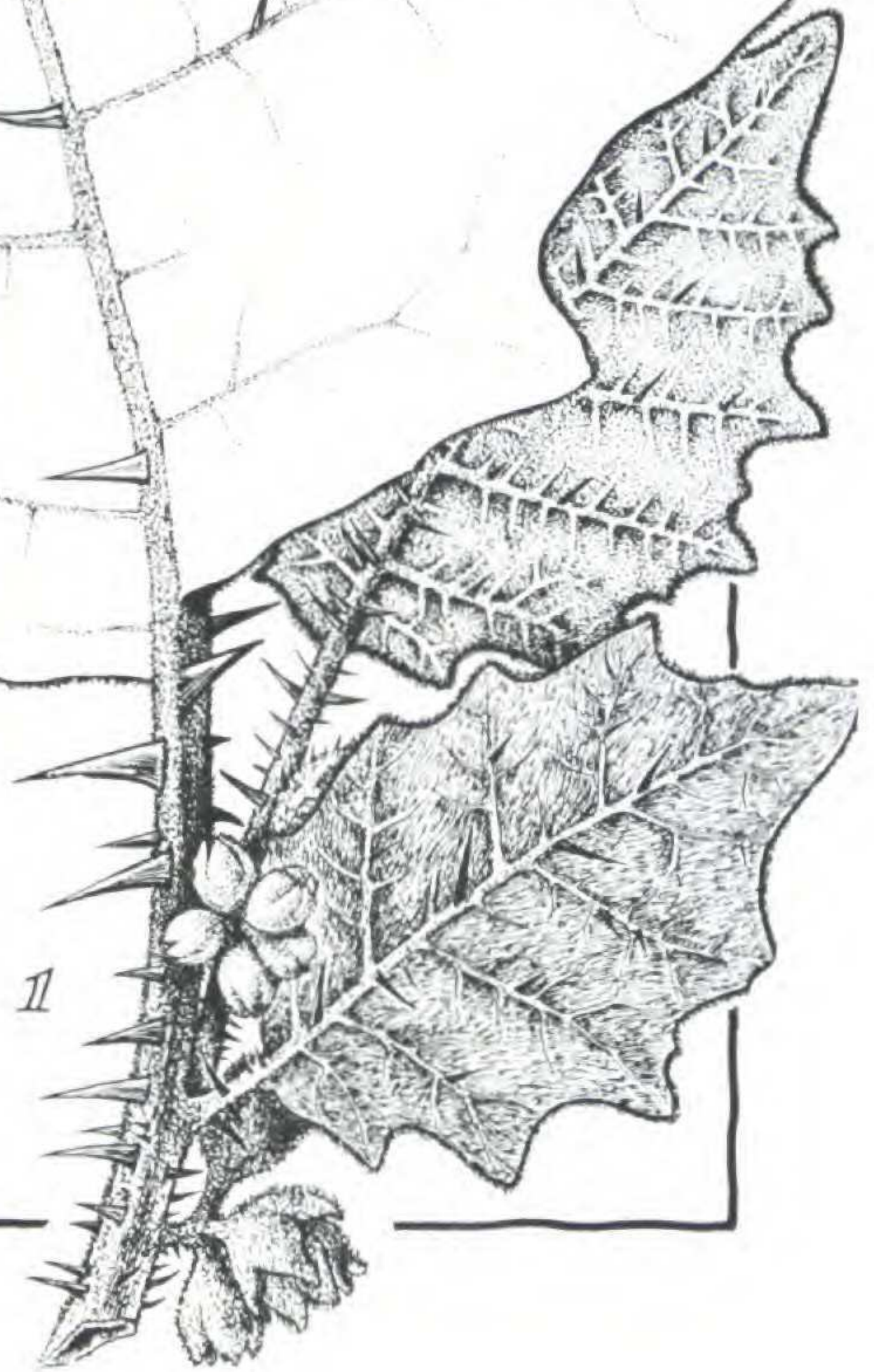


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EXPLANATION OF THE ILLUSTRATION

PLATE XXXIV. SOLANUM GEORGICUM *R. E. Schultes*.

Photograph of a flowering branch of the type plant.

Photograph by RICHARD EVANS SCHULTES

PLATE XXXIV



EXPLANATION OF THE ILLUSTRATION

PLATE XXXV. *SOLANUM GEORGICUM* *R. E. Schultes.*

Photograph of a fruiting branch of the type plant.

Photograph by RICHARD EVANS SCHULTES

PLATE XXXV



become but recently only partly domesticated. It is said by the natives, however, never to be found in the wild away from man's influence.

***Solanum liximitante* R. E. Schultes sp. nov.**

Frutex usque ad plusminusve quattuor ped. altus. Truncus ramique robustiores, basi spinosi. Ramuli usualiter sine spinis, glabri, cinereo-virides. Ramuli terminales puberulentes, cinereo-fusci. Folia membranacea, atroviridia, supra conspicue bullata, subtus cinereo-violacea (vivo), in circiter ovata, maturitate plusminusve 27 cm. longa, 20–22 cm. lata, basi cuneata ad subtruncata, apice acuta, margine profundissime sinuata, valde petiolata (petiolus usque ad 6–7 cm. longus, dense cinereo-pubescentis; supra remotissime stellato-pubescentes sed nervum centralium versus densissime stellato-pubescentes, minutissime scrobiculata; subtus molliter et dense stellata; nervis utroque latere conspicuis. Inflorescentiae cymosae, laterales, breviter pedunculatae, pauciflorae. Flores pedicellati; pedicellis usque ad 3 mm. longi, dense albido-stellato-pubescentes. Calyx cymbiformis, aliquid coriaceus, inconspicue 5-dentatus, usque ad 4 mm. longus, intus glaber, extus dense flavo-vel albido-stellatus. Corolla subcarnosa, albido-violacea (vivo), lobis oblongo-ovatis, usque ad plusminusve 6 mm. longis, apice rotundatis cucullatisque, margine valde reflexis, intus glabris, extus dense stellato-pubescentibus. Antherae erectae, flavae, lineares, quam corolla longae. Stylus plusminusve clavatus, usque ad 3 mm. longus. Ovarium dense stellatum. Fructus globosus, usque ad 1.5 cm. in diametro, maturitate sanguineus, dense et minutissime stellatus sed maturitate subglabrescens. Semina numerosa, plana, in circiter ovalia, 2 mm. longa.

COLOMBIA: Comisaría del Vaupés, Río Vaupés, Mitú, at mouth of Río Kuduyari. "Fruit red. Flowers whitish violet. Leaves purplish

beneath, dark green above, crinkled. Plant with spines on thick, basal stem, glabrous on younger growth. Cultivated." August 12, 1960, *Richard Evans Schultes 22583* (TYPE in Econ. Herb. Oakes Ames).—Same locality. "Lulo. Flores amarillo-verdosas. Fruto esférico, amarillento, comestible. Yerba cultivada." June 22-30, 1958, *H. García-Barriga, R. E. Schultes & H. Blohm 15771a*.—Comisaría del Vaupés, Río Inirida, vicinity of Santa Rosa. Alt. 220 m. "Hierba. Frutos rojos." January 25, 1958, *A. Fernandez 1961*.

Solanum liximitante appears to be related to *S. straminifolium*, but it has a very different appearance because of its conspicuously bullate leaves. *Solanum straminifolium* bears strong spines usually on all parts of the stem, branches and on the ultimate twigs as well as along the midrib and secondary veins of the leaves, whereas in *S. liximitante* the leaves and twigs, and often the branches themselves, are unarmed. There are, furthermore, certain interesting floral characters in *Solanum liximitante*, such as the very strongly cucullate corolla lobes with in-rolled margins, which are not matched in *S. straminifolium*. The fruit of *Solanum liximitante* is usually somewhat smaller than that of *S. straminifolium*.

The specific epithet of *Solanum liximitante* means "resembling a sutler or camp-flower" and has been chosen to emphasize the semi-domesticated state in which this species finds itself. It grows with no care near and in cultivated Indian plots. Footpaths through the growths of *Manihot* and *Erythroxylon* are often thickly populated by bushes of *Solanum liximitante* which have come up from seeds casually spread when pieces of the fruit have been spit out by Indians at work in the fields.

In the Amazonas and Vaupés of Colombia, *Solanum liximitante* is known by the following Indian names: Karijona (Río Caquetá)—*chě-how-kě-noo-roo*; Maku (Río Piraparaná)—*beñ*; Makuna (Río Apaporis)—*ě-tó*; Miraña (Río Caquetá)—*kö-mö-hě-ro-ya* (*kö-mö-hě* = "water turtle"); Puinave (living on Río Apaporis)—*pee-pee-ká*;

EXPLANATION OF THE ILLUSTRATION

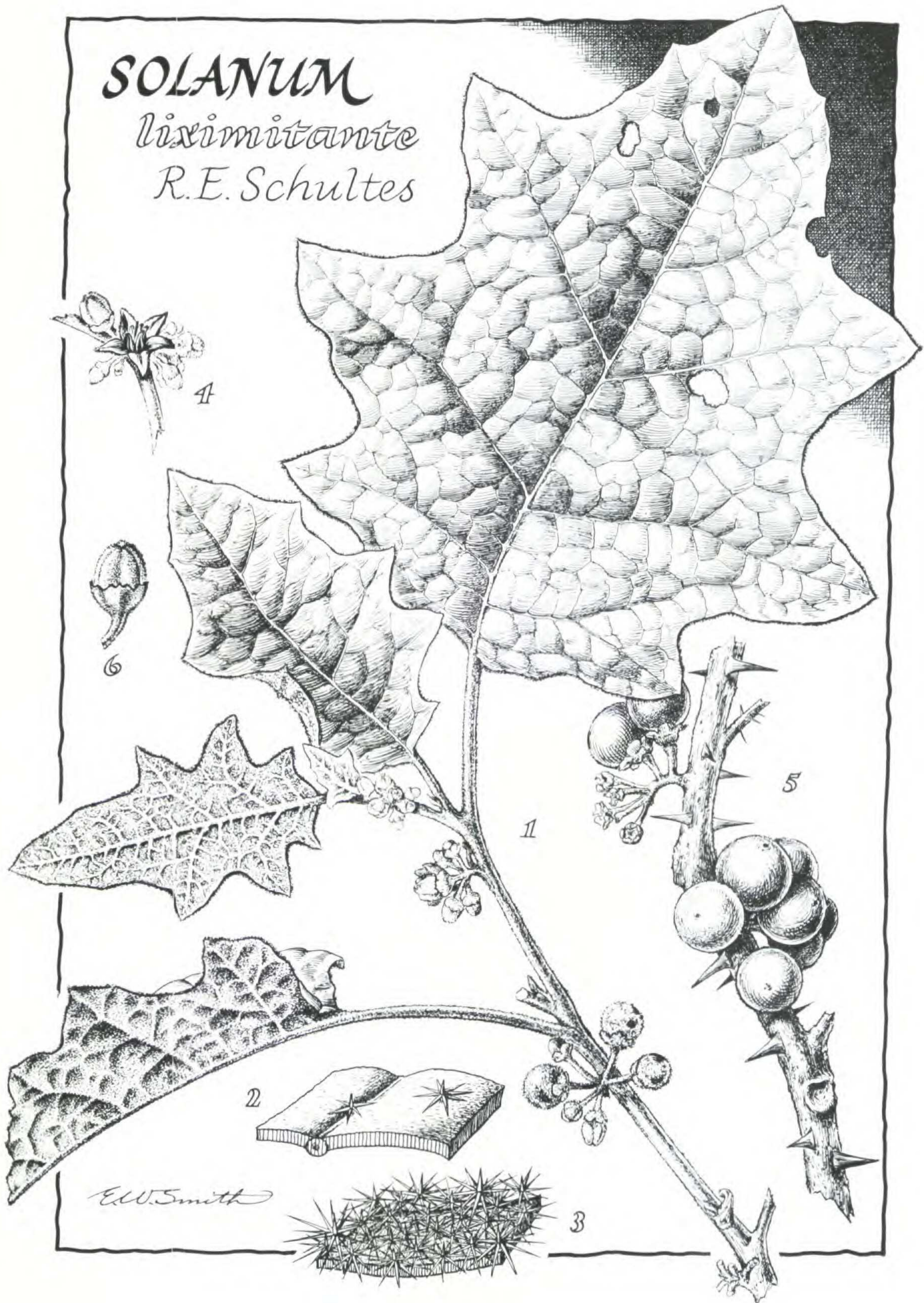
PLATE XXXVI. *SOLANUM LIXIMITANTE* *R. E. Schultes*.
1, branch, approximately one half natural size. 2,
portion of upper surface of leaf, greatly enlarged. 3,
portion of nether surface of leaf, greatly enlarged.
4, flower and buds, approximately one half natural
size. 5, portion of stem with fruits, approximately
one half natural size. 6, bud, approximately one and
one half times natural size.

Drawn by ELMER W. SMITH

SOLANUM

liximitante

R.E. Schultes



EXPLANATION OF THE ILLUSTRATION

PLATE XXXVII. *SOLANUM LIXIMITANTE* *R. E. Schultes.*

Photograph of fruiting branches of the type plant.

Photograph by RICHARD EVANS SCHULTES

PLATE XXXVII



Tanimuka (Río Popeyacá)—*a-meé-má-ra*; Yukuna (Río Miritiparaná)—*loo-poo-po-ró-la* (*loo-poo* = “cayman”). Karapana (Río Kananarí)—*lě-tó-ma-ta*.

Solanum muricatum *Aiton Hort. Kew.*, ed. 1, 1 (1789) 250.

Subshrub unarmed, up to 2–3 feet tall. Branches terete, greyish green in life, often verrucose-scabrid. Twigs reddish brown, very sparsely beset with simple, soft white hairs. Leaves membranaceous, oblong-lanceolate, marginally entire or slightly undulate (rarely ternate), apex acuminate, basally usually somewhat cuneate, strongly petiolate (petiole usually 3–6 cm. long, more or less marginate); upper surface white-sericeous (hairs single, but each comprising a main shaft with a minute, articulated tip); nether surface minutely white-squamate, sericeous (as upper surface); veins subconspicuous; midrib very conspicuous beneath. Inflorescence lateral, lax, few-flowered cymes. Flowers about 2 cm. in diameter, pedicellate; pedicels up to about 5 mm. long, sparsely white-sericeous. Calyx lobes triangular, apically attenuate, up to 12.5 mm. long, densely sericeous without, subglabrous within. Corolla thinly membranaceous, bright blue, deeply lobed, lobes ovate, apically acute, about 20 mm. long, pubescent without, glabrous within. Anthers yellow, erect, 6–7 mm. long. Style filiform, up to 9 mm. long. Ovary ovoid. Fruit very variable under cultivation; usually ovoid or elongate-ovoid, long-pedunculate, drooping, smooth, whitish or yellow, sometimes yellow-green, usually with purplish or reddish purple spots or lines, 5–20 cm. long. Pulp yellow with cucumber-like flavor. Seeds usually lacking in cultivated material.

COLOMBIA: Departamento de Caldas (?), “Quindío” (?) 1856, *J. Triana 3855/6*.—Departamento del Cauca, El Tambo, Cordillera Occidental, vertiente oriental, altitude about 1700 m. *K. von Sneidern 4817*.—Departamento de Cundinamarca, Bogotá, altitude 2600 m. “Nom-

bres vulgares: *pepino redondo*, *pepino morado*. Cultivado." November 1856, *J. Triana* 3855/65. Bogotá, Chapinero. "Nombre vulgare: *pepino morado*. Cultivado." *E. Perez-Arbeláez* 2507.—Departamento del Huila, Parque Arqueológico de San Agustín, altitude about 1700 m. "Nombre vulgar: *pepino*. Corolla blanca." *R. Romero-Castañeda* 6709.—Comisaría del Putumayo, road from Sachamates to Mocoa, above road camp "El Pepino," altitude about 4200 feet. "Cultivated. Common name: *pepino*." December 9, 1941, *R. E. Schultes & C. E. Smith* 3046.

Solanum muricatum, known from the Andean regions from Chile north to Colombia, has been cultivated since pre-Columbian times in the temperate highlands between 4200 and 7500 feet. A domesticated plant, it is represented now by several distinct cultivated forms, differing primarily in the fruit. (Popenoe, W.: "Economic fruit-bearing plants of Ecuador" in *Contrib. U.S. Nat. Herb.* 24 (1924) 133; U.S. Dept. Agric. Bur. Pl. Ind.: "Inventory of seeds and plants imported by the Office of Foreign Seed and Plant Introduction during the period from Jan. 1 to March 31, 1917" (Jan. 30, 1922) 17.) It is most commonly known as *pepino* ("cucumber") but it has other names, such as *pepo* in Lima, in reference to the shape of the fruit. In Colombia, it is referred to usually as *pepino morado* or *pepino redondo*.

Solanum muricatum, although described by Aiton as native to Chile and Peru, is native probably to Ecuador (where it appears to be most variable today) and was spread southward through human activity. In Colombia, its range is restricted essentially to the southern parts of the country, although it may occasionally be cultivated in the north (*Perez-Arbeláez, E.*: "Plantas útiles de Colombia," ed. 3 (1956) 709). It now occurs in Middle America, where it has doubtlessly been distributed in relatively recent times (*Standley, P. C.*: in *Ann. Rept. Smithson. Inst.* 1922 (1922) 317). It is an erect, usually spineless shrubby herb up to 2 or 3 feet in

height, with dense clusters of blue flowers somewhat less than an inch in diameter. The leaves are sometimes entire, but usually slightly undulate, occasionally trifoliate, linear-lanceolate to ovate, soft-pubescent. The fruit, an almost globose to ovoid or even elongate berry, measures usually 7 to 16 (sometimes 5 to 20) cm. in length. Most forms of the plant bear greenish, yellow or whitish fruits marked with purplish or reddish streaks or spots, but some may be basically pure yellow or pale green. It is juicy, aromatic and scented and somewhat acid, described frequently as resembling in taste "an acid eggplant." Most cultivated forms are said to produce seedless fruits. The plant is stated to yield fruit for three years, a crop every three or four months, and to begin to produce about five months after planting.

Too little is known about *Solanum muricatum*. The variability in fruit and the fact that some sources state that the plant may have spines might indicate that either more than one species or one or more definite botanical varieties are involved. Herbarium material is very scarce. A taxonomic study of variability in *pepino* over its whole range is long overdue.

This species was discussed as early as 1714 by Feuillée (in *Journ. Obs. Phys. Math. Bot.* (1714) 735, t. 26), who called it *Melongena laurifolia*, described it at length and published an illustration of it in his account of travels in Peru. It was first introduced to Europe apparently by the French horticulturist Thouin in 1785 (Aiton: loc. cit.) and, shortly thereafter, in 1789, described and given the name *Solanum muricatum* by Aiton at the Royal Botanical Gardens, Kew. The third botanical consideration of *pepino* was that of Ruíz and Pavón, the Spanish plant-explorers of Peru and Chile, who, in 1799, gave a full description of it, calling it *Solanum variegatum* and publishing an excellent drawing of the plant (*Fl. Peruv.* 2 (1799) 32, t. 162a).

There seems to have been no further horticultural interest in the species until 1882, when it was introduced into the United States by Eisen. (Anonymous: "Sundry investigations made during the year" in Bull. 37, Agr. Exper. Sta. Cornell Univ. (1891) 389-394; Bailey, L. H.: "Standard cyclopedia of horticulture" 3 (1930) 3182.) Because *pepino* means cucumber, Eisen thought it advisable to give the new introduction a more appropriate English common name. In this connection, he wrote (in Gard. Monthly 29 (1887) 84): "I suggested the name *melon shrub*, but through the error or the wisdom of a printer, the name was changed to *melon pear*, which I confess is not very appropriate. . . ." This name has persisted, however, in the American literature and, when the taste of the fruit—somewhat suggesting an acid musk melon—is taken into consideration, it is not altogether inappropriate. There was some success in cultivating *Solanum muricatum* in California and Florida (Anonymous, loc. cit.; in Am. Gard. 9 (1888) 265; Orch. and Gard. 10 (1888) 61), but in more northern states there was difficulty in its setting fruit. It does not do so well at low altitudes in Hawaii (Neal, M. C.: "In gardens of Hawaii" in Spec. Publ. Bishop Mus. 40 (1948) 657). At the turn of the century, Fairchild found that it had become very popular in the Canary Islands but that it was "doubtful whether it has found its proper niche there, where it can produce as delicate-flavored fruit as it does in the terraced gardens of Grand Canary."

In a very interesting and complete review of the culture and history of *pepino*, issued in 1891, the following recommendations were set forth: "The pepino is an unusually interesting plant, and if it could be made to set fruit more freely in the north, it would be an acquisition for the kitchen garden and for markets. It is a good ornamental plant. Altogether, it is deserving of a wider repu-

EXPLANATION OF THE ILLUSTRATION

PLATE XXXVIII. *SOLANUM MURICATUM* *Aiton* as illustrated by Fueillée in Journ. Obs. Phys. Math. Bot. (1714) t. 26 as *Melongena laurifolia*.

Melongena Laurifolia,
fructu turbinato, variegato

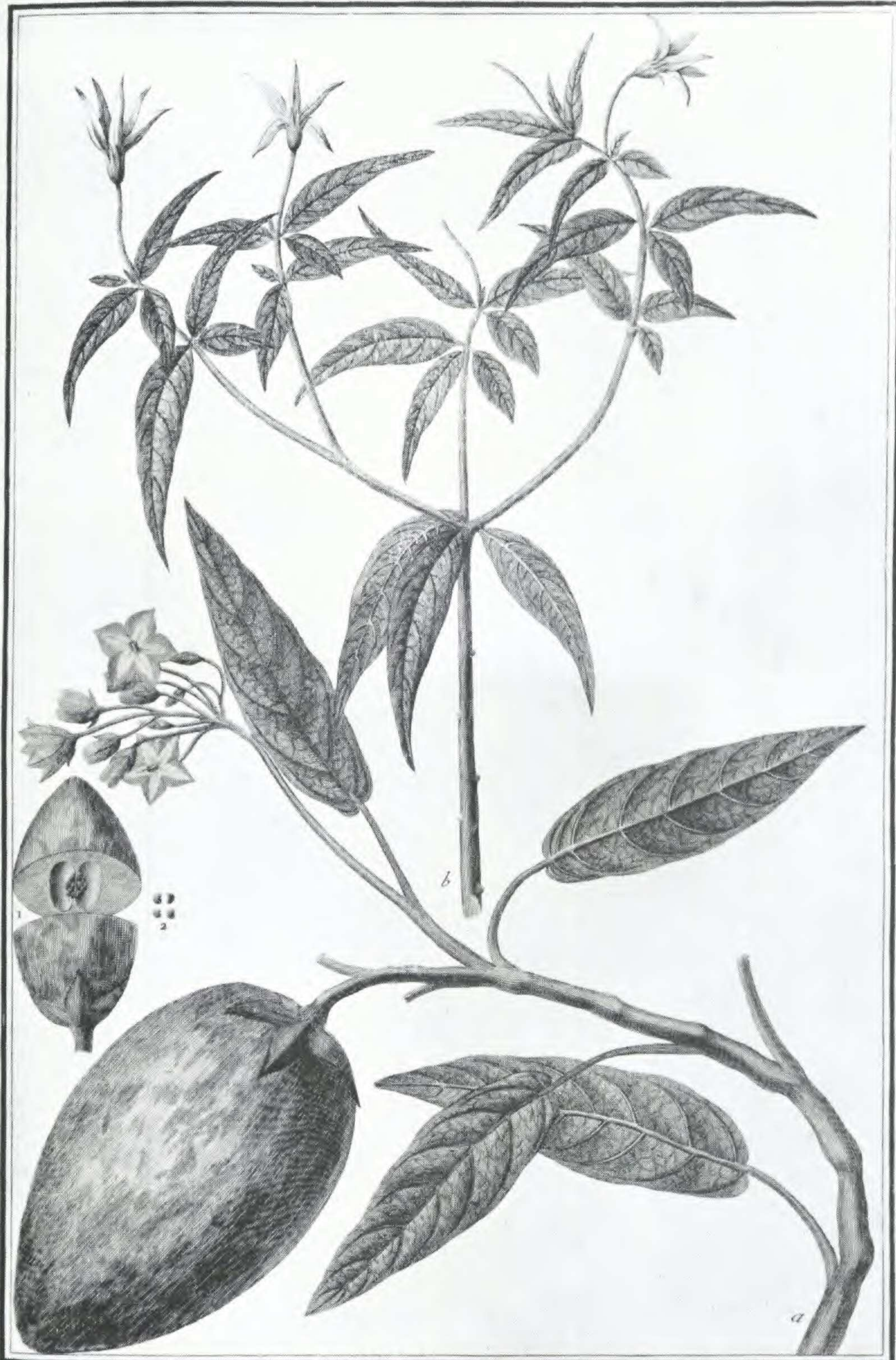


J. Pankke Botan. Reg. delin.

P. Giffart Sculp.

EXPLANATION OF THE ILLUSTRATION

PLATE XXXIX. SOLANUM MURICATUM *Aiton* (figure *a*)
as illustrated by Ruíz and Pavón in Fl. Peruv. 2
(1799) t. 162 under the name *Solanum variegatum*.



L. Galvez et J. Bruner delin.

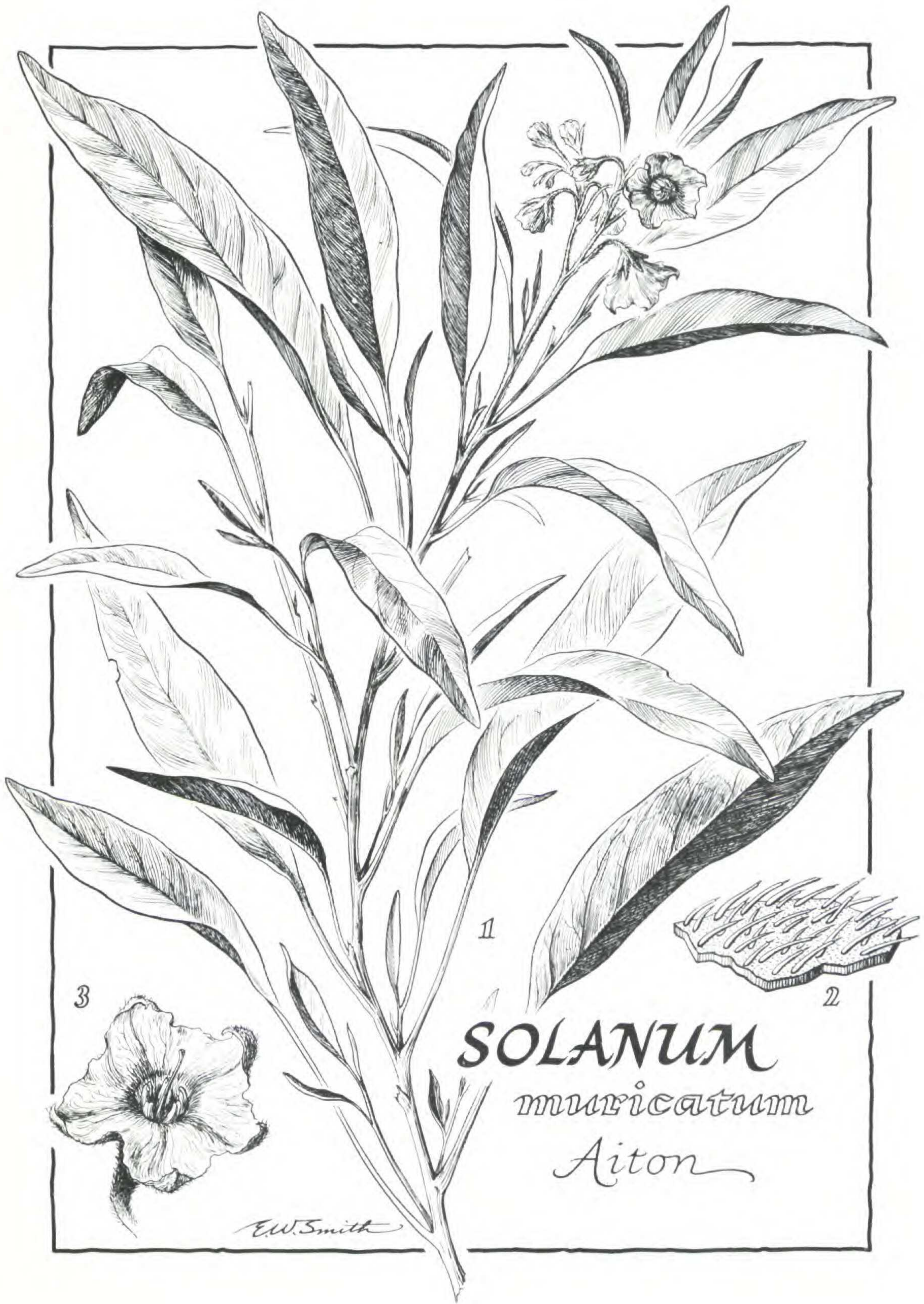
J. Cuvier sculp.

a SOLANUM variegatum. b SOLANUM acutifolium.

EXPLANATION OF THE ILLUSTRATION

PLATE XL. *SOLANUM MURICATUM* *Aiton*. 1, branch, approximately one half natural size. 2, portion of upper surface of leaf, greatly enlarged. 3, flower, approximately one and one half times natural size.

Drawn by ELMER W. SMITH



SOLANUM
muricatum
Aiton

EXPLANATION OF THE ILLUSTRATION

PLATE XLI. Fruits of *SOLANUM MURICATUM* *Aiton*, showing variation in shape in plants grown near Las Palmas, Canary Islands. Negative No. 9790, United States Department of Agriculture, Bureau of Plant Industry.

Photograph by DAVID FAIRCHILD (April 1903)

PLATE XLI



tation." Apparently, however, *Solanum muricatum* has never become more than a rare novelty in the United States, but the fruits do occasionally get into the markets locally in San Francisco and other parts of southern California.

***Solanum platyphyllum* Humboldt & Bonpland ex Dunal** Sol. gen. aff. syn. (1816) 38.

Shrub occasionally weakly armed, rank, up to about 4 feet tall. Branches stout, terete. Twigs white-stellate-pubescent. Leaves membranaceous, ovate in outline, at maturity up to about 30 cm. long, 22 cm. wide, basally truncate, apically abruptly acute, marginally distantly, regularly and deeply minute, strongly petiolate (petiole up to about 10 cm. long, somewhat sulcate, brownish-stellate-pubescent); upper surface dark green, asperous-lepidote and very sparsely stellate-pubescent; nether surface pale green, densely and softly stellate-pilose; veins conspicuous especially beneath. Inflorescence a lateral, very short-peduncled, few-flowered cyme. Flowers pedicellate; pedicels more or less 5 mm. long, stellate-pilose. Calyx cup-shaped, crassulent, densely white-stellate-pilose without, white-lepidote within, apically sinuate, 5-dentate, more or less 3.5 mm. long. Corolla somewhat crassulent, lobes triangular, apically acute, marginally conspicuously inrolled, up to about 9 mm. long, very densely white-stellate-pubescent. Anthers yellow, erect, linear, about 7 mm. long. Style filiform, apically slightly clavate, 5.5 mm. long. Fruit globose, up to about 2 cm. in diameter, ripening purplish red, glabrous (only in young form with dense stellate hairs). Pulp strongly acid. Seeds numerous, flat, oval in outline, yellowish.

COLOMBIA: Comisaria del Amazonas, Trapécio amazónico, Loretoyacu River, altitude about 100 m. "Flowers white. Fruit edible." October 20-30, 1945, *R. E. Schultes* 6642.

Solanum platyphyllum is rather frequently found along the edge of cultivated plots and secondary growth in the Leticia area of the Colombian Amazonas. Like most other species of *Solanum* with edible fruits known from the Amazonian area, this species is not purposefully cultivated but springs up in abandoned sites from seeds which are cast away with uneaten portions of the fruit. The whitish fruits are rather sweet and are sought after for food by the Tikuna Indians of the region.

Little is known about *Solanum platyphyllum* as an economic plant. A collection (*Krukoff 9121*) from São Paulo de Olivença, a Brazilian town on the Amazon (Solimões) River slightly below Leticia, bears the notation: "Planted by Indians." Since the Indians of this area are likewise Tikunas, it may be that the plant is used only by this tribe. The species probably occurs also in Peruvian territory upstream from Leticia, but we have no information concerning its existence and use there.

Solanum quitoense *Lamarck* *Illustr.* 2 (1797) 16.

Solanum angulatum *Ruiz & Pavón* *Fl. Peruv.* 2 (1799) 36, t. 170, fig. a.

Solanum quitense *Humboldt, Bonpland & Kunth* *Nov. Gen. & Sp.* 3 (1818) 25.

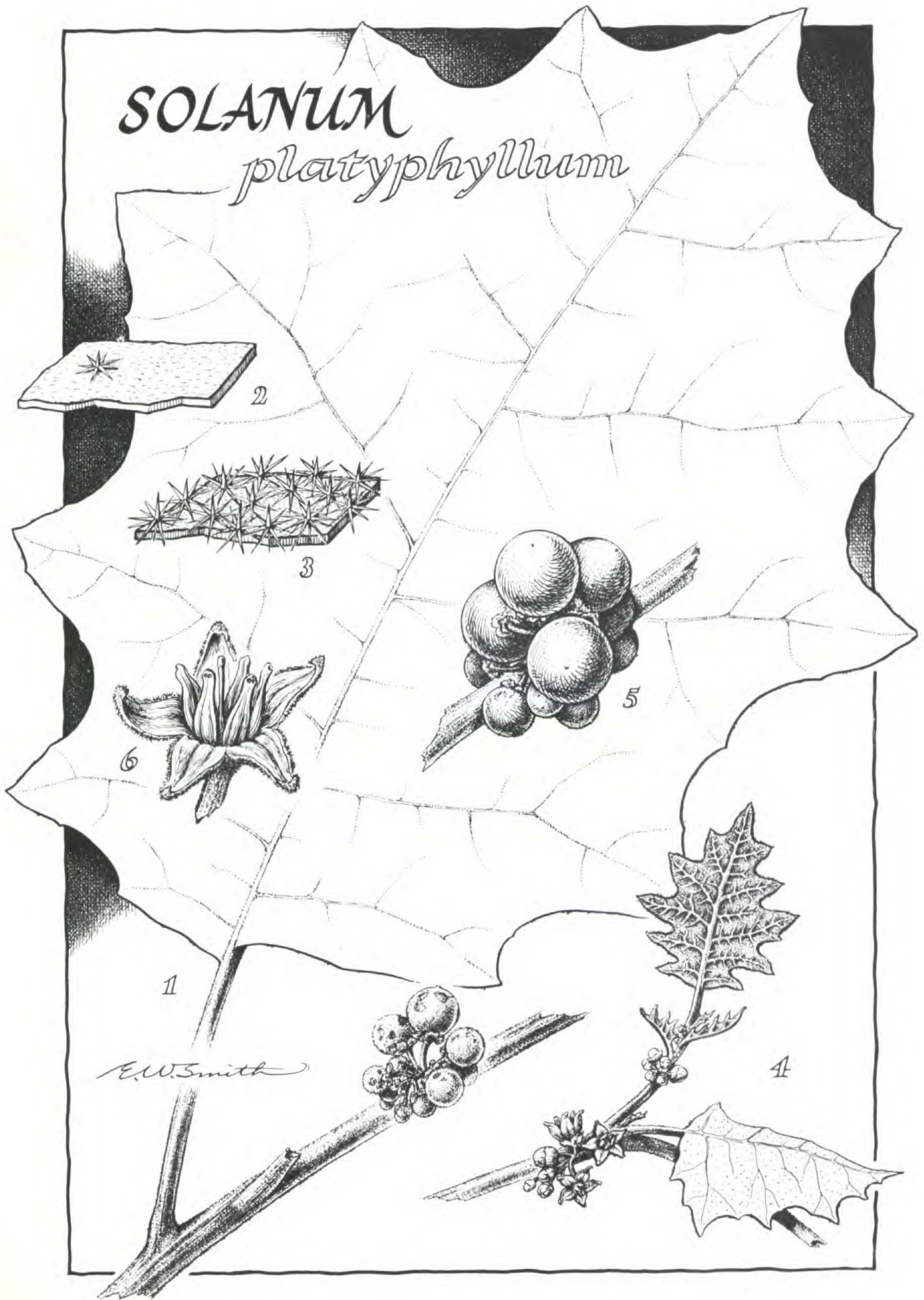
Shrub unarmed, robust, rank, up to 5–7 feet tall (rarely taller). Branches stout, terete, densely soft stellate-pubescent; wood soft. Twigs densely soft-pubescent. Leaves coarsely membranaceous, usually oblong-ovate in outline, at maturity up to about 50 cm. (usually 35–40 cm.) long, 32 cm. wide, basally clasping and cordate, apically abruptly acuminate, marginally distant, deeply and regularly sinuate, strongly petiolate (petiole terete, up to about 15–18 cm. long, densely and softly stellate-pubescent); upper surface white stellate-pubescent; nether surface softly and very densely stellate-pubescent,

EXPLANATION OF THE ILLUSTRATION

PLATE XLII. *SOLANUM PLATYPHYLLUM* *H. & B.* 1, fruiting branch and leaf, approximately one half natural size. 2, portion of upper surface of leaf, greatly enlarged. 3, portion of nether surface of leaf, greatly enlarged. 4, young leaves and flowers, approximately one half natural size. 5, cluster of fruits, approximately one half natural size. 6, flower, approximately twice natural size.

Drawn by ELMER W. SMITH

SOLANUM
platyphyllum



with two sizes of stellate hairs occurring together; veins pinnate, more or less 10 on each side, midrib and lateral nerves conspicuous on both surfaces but especially so beneath; blade dark green above, pale green with definite purplish hue beneath. Inflorescence a lateral, very short-peduncled, few-flowered cyme. Flowers pedicellate, white, about 4 cm. in diameter; pedicels stoutish, up to 15 mm. long, densely tawny-purple stellate. Calyx lobes subcrassulent, more or less triangular, apically subacute, up to about 11 mm. long, basally 8 mm. wide, extremely densely purple-white stellate pubescent without, glabrous within. Corolla thick, membranaceous, white, lobes oblong-ovate, up to about 10–11 mm. long, 4–5 mm. wide, apically obtuse to occasionally subacute, glabrous within, densely white stellate-pubescent without. Anthers yellow, erect, linear, about 8 mm. long. Ovary globose, densely white-stellate. Fruit globose, rarely round-ovate, about 5 cm. in diameter, orange-colored when ripe, densely covered with easily deciduous white stellate hairs. Pulp acidulous, pale yellowish green. Seeds very numerous, flat, oval in outline, about 4 mm. long, yellowish white.

COLOMBIA: No definite locality. 1842. *Sinclair s.n.* Comisaria del Putumayo, Valley of Sibundoy, Sibundoy, altitude about 2225 m. "Kamsá name = *ma-sha-kve*." February 16, 1941, *R. E. Schultes 3271*. — Same locality. May 29, 1946, *R. E. Schultes & M. Villareal 7616*. — Departamento del Huila, San Agustin, Parque Arqueológico, altitude 1600–1700 m. Nombre vulgar = *naranjilla*." November 29, 1957, *R. Romero-Castañeda 6595*. — Comisaria del Putumayo, road from San Francisco to Mocoa, altitude about 2500 m. "Leaves purplish beneath. Flowers white. Cultivated. *Naranjilla*." July 27, 1960, *R. E. Schultes 22549*.

Solanum quitoense, native apparently to Ecuador, grows best on the high, rainy but well drained slopes of Andean valleys between 4500 and 7500 feet, from southern Colombia to northern Peru. The plant requires about sixty inches of rain a year (McCann, L. P. : "Ecuador's

naranjilla—a reluctant guest” in *Agric. Americas* 7 (1947) 146–149). In Colombia, it seems to be found from Popayan southward, but a northern variety with spines is found from El Valle north and into Venezuela. In Colombia, it is not grown in any commercial quantities save in Nariño: the *naranjillo* or *lulo* may be found in abundance throughout the year in the native market in Pasto.

Solanum quitoense is cultivated on a large scale chiefly in Baños in El Topo region of Ecuador (Chalons, M. E. R. “Naranjillas—the golden fruit of the Andes” in *Agric. Americas* 4 (1944) 110–112). It is planted about 255 to an hektar and bears for fourteen to twenty-four months. The annual yield per hektar has been estimated as 12,500 gallons of juice and the “production of 2,000 tons of fruit requires not more than 100 hektars (about 24.7) acres of land.”

Hodge has postulated that, while *Solanum quitoense* dates certainly from pre-Spanish times, it is a relatively new arrival on the scene of cultivated plants (Hodge, W. H.: “Naranjillas or ‘little oranges’ of the Andean highlands” in *Journ. N. Y. Bot. Gard.* 48 (1947) 155–159). His main argument for this thesis stems from the absence of the *naranjillo* from pre-Columbian plant remains in ancient Peru. It is true that *Solanum quitoense* may not have been known to the Incas of Peru, but we must bear in mind that this plant must have a long association with man and agriculture, inasmuch as it is apparently no longer found in a wild state.

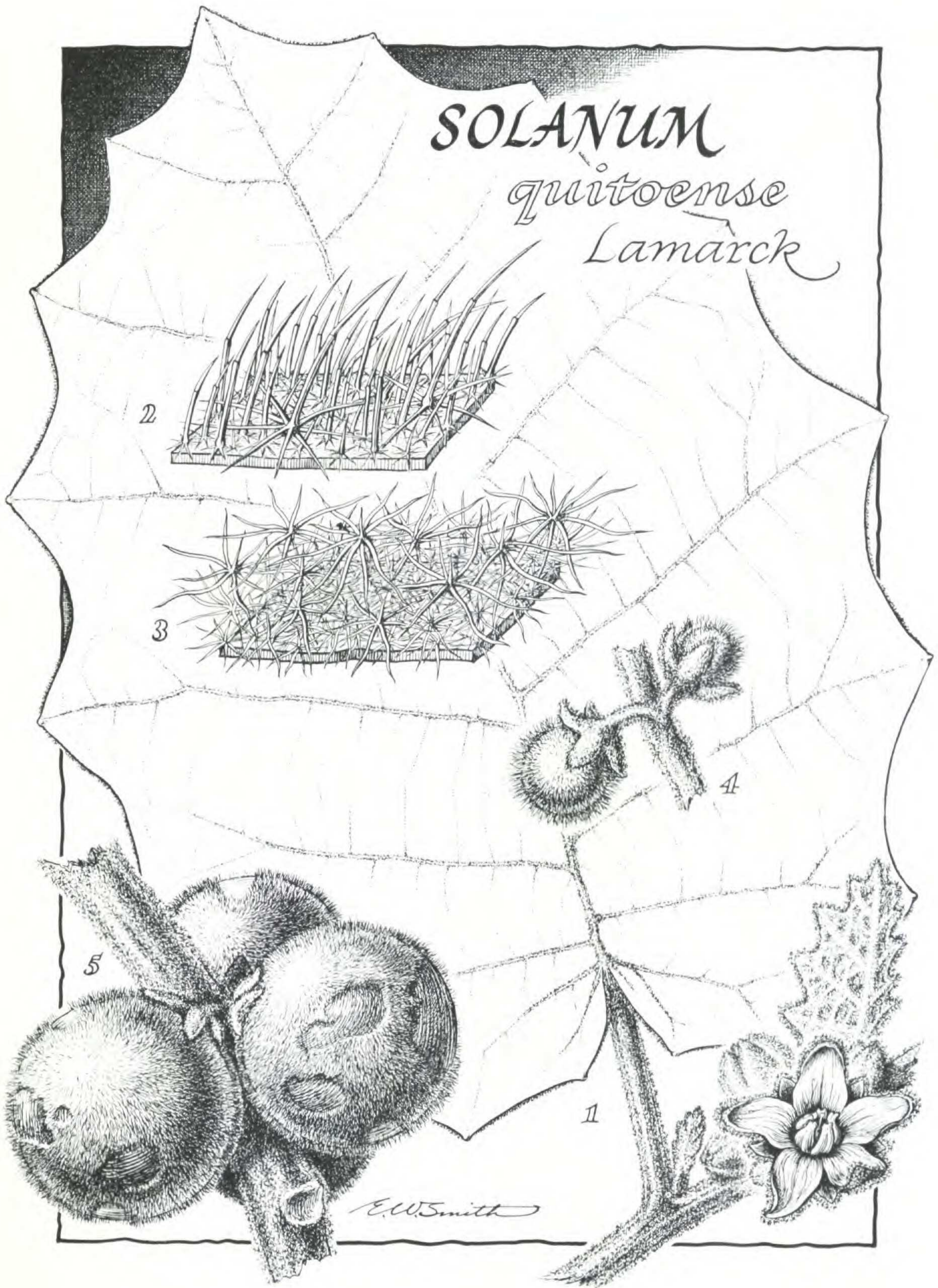
The fruit of *naranjilla*, so called because its color matches that of the orange, is not eaten directly but is prepared in a *sorbete* or drink. Sugar must be added because the flavor is rather tartly acid. The drink is beaten into a foamy consistency when served. The freshly squeezed light greenish juice is rich in pepsin and albu-

EXPLANATION OF THE ILLUSTRATION

PLATE XLIII. *SOLANUM QUITOENSE* *Lamarck*. 1, flowering branch, approximately one half natural size. 2, portion of upper surface of leaf, greatly enlarged. 3, portion of nether surface of leaf, greatly enlarged. 4, young fruits, approximately one half natural size. 5, mature fruits, approximately one half natural size.

Drawn by ELMER W. SMITH

SOLANUM
quitoense
Lamarck



men, proteins (up to 1.5%) and minerals (especially lime, magnesium and phosphate varying from .98% to 1.6%) (Gattoni, L. A.: "La naranjilla (*Solanum quitoense*)" Serv. Interam. Coop. Agric., Min. Agric. Com. Industr. Panama (April 1957). The taste of the juice, when sweetened, has been likened to a combination of orange, pineapple and tomato.

Attempts have been made to cultivate *Solanum quitoense* outside of its native range, but they have not been successful except in Guatemala. A recent cytological study indicates the occurrence of structural heterozygosity in the species which might be of advantage for adapting the plant to tolerance of wider ecological conditions.

***Solanum quitoense* Lamarch var. septentrionale**
R. E. Schultes & Cuatrecasas in Bot. Mus. Leaflet Harvard Univ. 16 (1953) 100, t. 17.

Shrub differing from *Solanum quitoense* primarily in having spines and spinules on the branches, petioles and nerves of both surfaces of the leaf.

It seems that typical *Solanum quitoense* is confined to Ecuador and southern Colombia. It is completely devoid of spines. Specimens from the northern periphery of the range of this species, however, are, with one exception, variously spiny. In all other respects—even to the purplish hue of the indumentum—the northern material is indistinguishable. There is great variation in the abundance and size of the spines. This condition does not argue against the separation as a distinct variety of the spiny from the unarmed variants, because *Solanum* tends to be extremely variable in respect to spines *where they occur*.

Of interest in this connection is the fact that the Mutis collection of water-colors of Colombian plants, executed between 1783 and 1808 and which are preserved in the

Jardín Botánico in Madrid, has plates of the two concepts *Solanum quitoense* and *S. quitoense* var. *septentrionale*. Plate 38 in volume 19 depicts one drawing of a flowering branch with a floral dissection and one with a fruiting stem and dissected fruit; this is the unarmed *Solanum quitoense*. Plate 39 shows a leafy branch in flower and one piece of stem in fruit; the stems, petioles and veins are armed with spines.

COLOMBIA: Departamento de Antioquia. No date. *Jervis* s.n. Itaquí, July 1944, *Br. Daniel 3352*. Alrededores de Medellín, Río Negro, altitude about 1560 m. “*Lulo*. Cultivated.” February 11, 1946, *W. H. Hodge 6712*.—Departamento de Magdalena, Santa Marta, altitude 6000 ft. January 1903, *H. H. Smith 1853*.—Departamento de Santander, vicinity of California, altitude 3000 m. “*Tumo*. Shrub 4–6 ft. Corolla light blue, anthers yellow. Open hillside. January 11–27, 1927, *E. P. Killip & A. C. Smith 16949*.—Vicinity of Charta, altitude 2000–2600 m. “Shrub 4–6 ft. Corolla white, blue at margin; anthers yellow.” February 1–11, 1927, *E. P. Killip & A. C. Smith 18913*.—Departamento de Cundinamarca, cercanías de San Bernardo hacia Sasaima, altitude 1600–1800 m., June 23, 1940, *J. Cuatrecasas 9604*.—Departamento del Norte de Santander, near Ocaña, January 1878, *Kalbreyer 543*.—Departamento del Tolima, Ibagué, 1844, *J. Goudot s.n.*—Departamento del Valle de Cauca, La Paila, April 1853, *Holton 23*.—Cordillera Occidental, vertiente occidental, hoya del Río Digua, lado izquierdo, Piedra de Moler, altitude 1050 m. “*Lulo de perro*.” August 19–28, 1943, *J. Cuatrecasas 15031*.—Cordillera Occidental, vertiente oriental, Quebrada del Tigre, Quebradita de Pultabrava, altitude 1440 m., October 28, 1946, *J. Cuatrecasas 22694*.—Cordillera Occidental, vertiente occidental, hoya del Río Digua, Río San Juan, abajo de Queremál a la derecha del río entre km. 52 y 53, altitude 1300–1500 m. “*Lulo morado*.” March 19, 1947, *J. Cuatrecasas 23853*.—Cordillera Occidental, vertiente occidental, hoya del Río Digua, lado derecho, entre Queremál y La Elsa, altitude 1200–1160 m. “*Lulo*.” March 27, 1947, *J. Cuatrecasas 23992*.

***Solanum sessiliflorum* Dunal** Sol. gen. aff. syn. (1816) 43.

According to Ducke (Ducke, A.: “Plantas de cultura precolumbiana na Amazônia brasileira. Notas sobre as especies ou formas espontaneas que supostamente lhes teriam dado origem” Bol. Técn. Inst. Agron. Norte,

no. 8 (1946) 9), *Solanum sessiliflorum*, known as *cubiu*, is common in the Brazilian Estado do Amazonas, especially in its westernmost part along the Solimões River, where it is found both cultivated and wild. The fruits are said to be edible. There is, he states, another species of *Solanum* with small, edible fruits also known as *cubiu* along the Solimões; we believe that this species, which Ducke did not identify, may possibly be *Solanum platyphyllum*.

Sendtner (in Martius Flora Brasiliensis pt. 6 (1846) 73) cited *Solanum sessiliflorum* from Pará, at the mouth of the Amazon River, under the common name *cubio*.

We have no evidence that *Solanum sessiliflorum* is cultivated in Colombian territory, but it naturally must be expected there if it be common in the western part of the Brazilian Amazon.

It should be pointed out that the vernacular Nengatú name *cubiyú* is applied in the Colombian Vaupés to several species of *Solanum*: *S. livimitante*, *S. straminifolium*, *S. Topiro*; it seems to be a rather generic name used for a number of species of *Solanum* with edible fruits. Near Mitú, there is a river, an affluent of the Vaupés, called Río Kūbiyú.

***Solanum sisymbriifolium* Lamarek** Illustr. 2 (1797) 25.

Herb up to 3 ft. tall, rank, heavily armed throughout with spines. Branches spiny. Twigs beset with stout orange or yellow spines up to 7 mm. long or longer and with distant, whitish, stipitate, stellate hairs. Leaves membranaceous, oblong or ovate, sinuately lobed or very deeply pinnatifid with sinuate or deeply dissected lobes, usually up to 12 cm. long (without petiole), 8–10 cm. wide (petiole 2–5 cm. long, with spines and stellate hairs similar to those of twigs); upper surface subdensely and coarsely stellate-pubescent, with long yellow spines along

nerves; nether surface similarly spinose and densely stellate-pubescent. Inflorescence a terminal or soon lateral raceme, few-flowered (axis strongly spinose). Flowers numerous, pale bluish, white or sometimes pale violet, about 2 cm. in diameter. Calyx lobes externally very densely spinose and sparsely stellate-pubescent, subglabrescent within, persistent in fruit, lobes narrowly triangular, apically acute, up to 8–10 mm. long, lengthening to 20 mm. with ripening of fruit. Corolla membranaceous, up to about 20 mm. long, externally goldenstellate, internally glabrous. Anthers yellow, erect, linear, about 14 mm. long with flattened filaments 4 mm. long. Ovary globose. Fruit globose, red or red-brown, up to 2.5 cm. in diameter.

COLOMBIA: Departamento de Antioquia, Abejorral, altitude 2150 m. "Nombres vulgares: *tapaculo*; *uchuba colorado*; *mancadera*." February 1852. *J. Triana* 3855/5.—Departamento de Boyaca, Valle de la Candelaria, Municipio de Ráquira, altitude 2619 m. "Nombre vulgar: *pomas de perro*." March 1941. *A. Ranghel Galindo* 98.—Departamento del Cauca, between Popayán and Puracé, crossing Río Anambio, altitude 2500 m. July 10, 1939. *E. Pérez-Arbeláez & J. Cuatrecasas* 5860.—Tres Cruces, vicinity of Popayán. November 6, 1948. *S. Yepes Agredo, J. Araque Molina & F. A. Barklay* 18Ca015.—Cordillera Occidental, eastern slopes, Chiquio, 21 km. NW of El Tambo, altitude 1700–1900 m. September 30, 1954. *A. Fernández Pérez* 2732.—Departamento de Cundinamarca, La Cabrera, Pandi. July 1930. *E. Pérez-Arbeláez* 615.—Fusagasugá, below town on road passing Hotel Sabaneta near Río Chocho. June 5, 1942. *G. Gutiérrez V. & R. Jaramillo M.* 320.—Departamento de Magdalena, Pozos de Agriacoca." Herba de 0.7 m. Corola blanco-lila. Frutos verdes. May 16, 1951. *R. Romero-Castañeda* 8919.—Departamento de El Valle, Cali. May 3, 1935. *H. García-Barriga* 4369.—Vicinity of Cali, altitude 1000 m. "Nombre vulgar: *uva de perro*." July 1938. *J. M. Duque-Jaramillo* 4104.—Monte Frio, Yanaconas, altitude 17–1850 m. February 27–March 1, 1939. *E. P. Killip & H. García-Barriga* 33732.

This species is native to tropical America at higher elevations, but it is naturalized in waste ground in the West Indies and southeastern United States.

In Colombia, where it has a large number of vernacular

names, it grows subspontaneously and is semi-cultivated along roadsides and the edges of cultivated land.

***Solanum straminifolium* Jacquin Misc. 2 (1781) 298.**

Shrub up to about 6 ft. tall. Trunk and basal parts of woody branches and branchlets heavily armed with spines. Leaves membranaceous, dark green above, grey-green (in life) beneath, ovate in outline, up to about 30 cm. long, 16–25 cm. wide, basally unequally truncate, apically acute, marginally very deeply sinuate, strongly petiolate (petiole up to 9 cm. long, 0.5 cm. in diameter, armed with strong spines protruding at right angles, sparsely stellate); upper surface very remotely stellate-pubescent, otherwise subglabrous; nether surface very densely white-stellate; veins conspicuous, armed above and below with relatively stout spines. Inflorescence a lateral, stout-peduncled, few-flowered cyme (peduncles up to 1.3 cm. long). Flowers pedicellate, pedicels up to 8 mm. long, white-stellate-pubescent. Calyx cup-shaped, leathery, inconspicuously 5-dentate, up to 3 mm. long, glabrous within, densely yellow- or white-stellate without. Corolla white with oblong lobes up to 9 mm. long, apically subacute, glabrous within, extremely densely white-stellate without. Anthers erect, yellow, linear, usually shorter than corolla. Style clavate, up to 4.5 mm. long. Ovary densely stellate. Fruit globose, up to about 3 cm. in diameter, red, densely and very minutely stellate but subglabrescent when ripe. Seeds numerous.

COLOMBIA: Comisaría del Vaupés, Río Piraparaná, altitude 250–600 m. “Arbusto de 2 m. Flores blancas.” August 27–31, 1952. *H. García-Barriga 14256*.—Río Vaupés, Cachivera de Yurupari, altitude 400 m. “N. v. *cobuía* (Kubeo). Yerba 1 m. Flores blancas; frutos rojos.” October 24–26, 1952. *H. García-Barriga 14946*.

It would seem that the collections cited above may be referred to *Solanum straminifolium*, although much more

research needs to be done to ascertain exactly the specific limits of this concept. It is closely allied to *Solanum liximitante*: the differences were discussed above under *S. liximitante*. If the limits of the apparently rather widespread *Solanum straminifolium* can be resolved, *S. liximitante* may perhaps deserve but varietal rank. At the present time, however, it appears to be wiser to recognize them as distinct. They are distinct in the field, and the Indians of the Vaupés of Colombia easily point out the differences, recognizing them occasionally by the use of slightly different common names for the two. There may, however, be natural hybridization in some localities where both have been grown for long periods together.

Solanum straminifolium grows in the lowland, tropical forest regions of Amazonian Colombia, never passing 1500 feet above sea-level. The natives of this area not only eat the fruits but put them in vinegar for pickling and to use as condiments in other foods. It is called *e-to-pa-a* in Tukano of the Vaupés (Romero-Castañeda loc. cit. 288) and, amongst the Kubeos of the same area, the name *ko-bu-yá* is employed.

***Solanum Topiro* Humboldt & Bonpland ex Dunal**
Sol. gen. aff. syn. (1816) 10.

Shrub unarmed, robust, rank, up to about 5 ft. tall. Branches stout, terete, scurfy-pubescent, grey-green in life. Twigs densely white-stellate-tomentose. Leaves coarsely membranaceous, ovate in outline, at maturity up to about 48 cm. long, 36 cm. wide, basally inequilaterally truncate, apically abruptly acute, marginally very distantly and very deeply sinuate, strongly petiolate (petiole up to 12 cm. long, densely white-stellate-tomentose); upper surface coarsely tomentose and densely clad with somewhat stiff, sericeous white hairs (some of which have basally a stellate formation) sparsely inter-

persed with white-stellate hairs; nether surface very softly and densely white-stellate-tomentulose; veins strong and conspicuous above and below, extremely densely white-stellate-tomentulose. Inflorescence a lateral, very short-peduncled, few-flowered cyme. Flowers pedicellate; pedicels up to 6 mm. long, 1.5–2 mm. in diameter, very densely stellate-tomentulose. Calyx lobes somewhat crassulent, more or less triangular-ovate, apically subacute, up to about 15 mm. long, very densely and softly greyish brown-stellate-tomentulose without, glabrous but with minute white scabs within. Corolla membranaceous, white or greenish white, lobes oblong-ovate, up to about 20 mm. long, apically subacute, glabrous within, densely stellate-tomentulose without. Anthers yellow, erect, linear, about 9–10 mm. long. Style terete, 7–8 mm. long. Ovary globose, very densely long-white-sericeous. Fruit subglobose to ovoid, up to 4.5 (possibly 5) cm. in diameter, ripening orange-red, sometimes tomato-red, densely and minutely stellate-tomentulose (hairs easily caducous upon handling), becoming subglabrous upon ripening. Pulp acidulous. Seeds very numerous, flat, oval in outline, 3–4 mm. long, 2–2.5 mm. wide, pale yellowish.

COLOMBIA: Comisaria del Amazonas, Río Caquetá, vicinity of La Pedrera. April 1944, *R. E. Schultes* 5881.—Río Loretoyacu, altitude about 100 m. September 1946, *R. E. Schultes & G. A. Black* 8394.—Río Apaporis, Soratama, near mouth of Río Kananari. “*Lulo. Topirú.* Fruit ovoid, orange, covered with hair in unripe stage. Cultivated. Flowers whitish with yellow anthers.” March 1951, *R. E. Schultes* 12081.—Same locality. “*Kubeo = be-tá-ka. Taiwano = de-twá. Tatuya = de-twá.* Cultivated.” September 1, 1951, *R. E. Schultes & I. Cabrera* 13842.—Comisaria del Putumayo, Río Putumayo, Puerto Asis. “Shrub up to 3 ft. Fruit orange-red, covered with caducous hairs. Leaves and petioles spineless. “*Lulo. Cocona.*” August 2, 1960, *R. E. Schultes* 22571.—Comisaria del Vaupés, Río Vaupés, Mitú. *H. García-Barriga, R. E. Schultes & H. Blohm* 15771.

In the Vaupés and Amazonas of Colombia, the following Indian names are used for *Solanum Topiro*: Karapana

PLATE XLIV



PLATE XLIV. *SOLANUM TOPIRO* *H. & B.* Flowering branch of the plant from which *Schultes 12081* was collected.

Photograph by RICHARD EVANS SCHULTES



PLATE XLV. *SOLANUM TOPIRO* H. & B. 1, flowering branch, with medium-sized leaf, about one half natural size. 2, portion of the upper surface of the leaf, greatly enlarged. 3, portion of the nether surface of the leaf, greatly enlarged. 4, inflorescence, about one half natural size. 5, fruits, about one half natural size. 6, young leaf, about one half natural size. Drawn by ELMER W. SMITH

PLATE XLVI

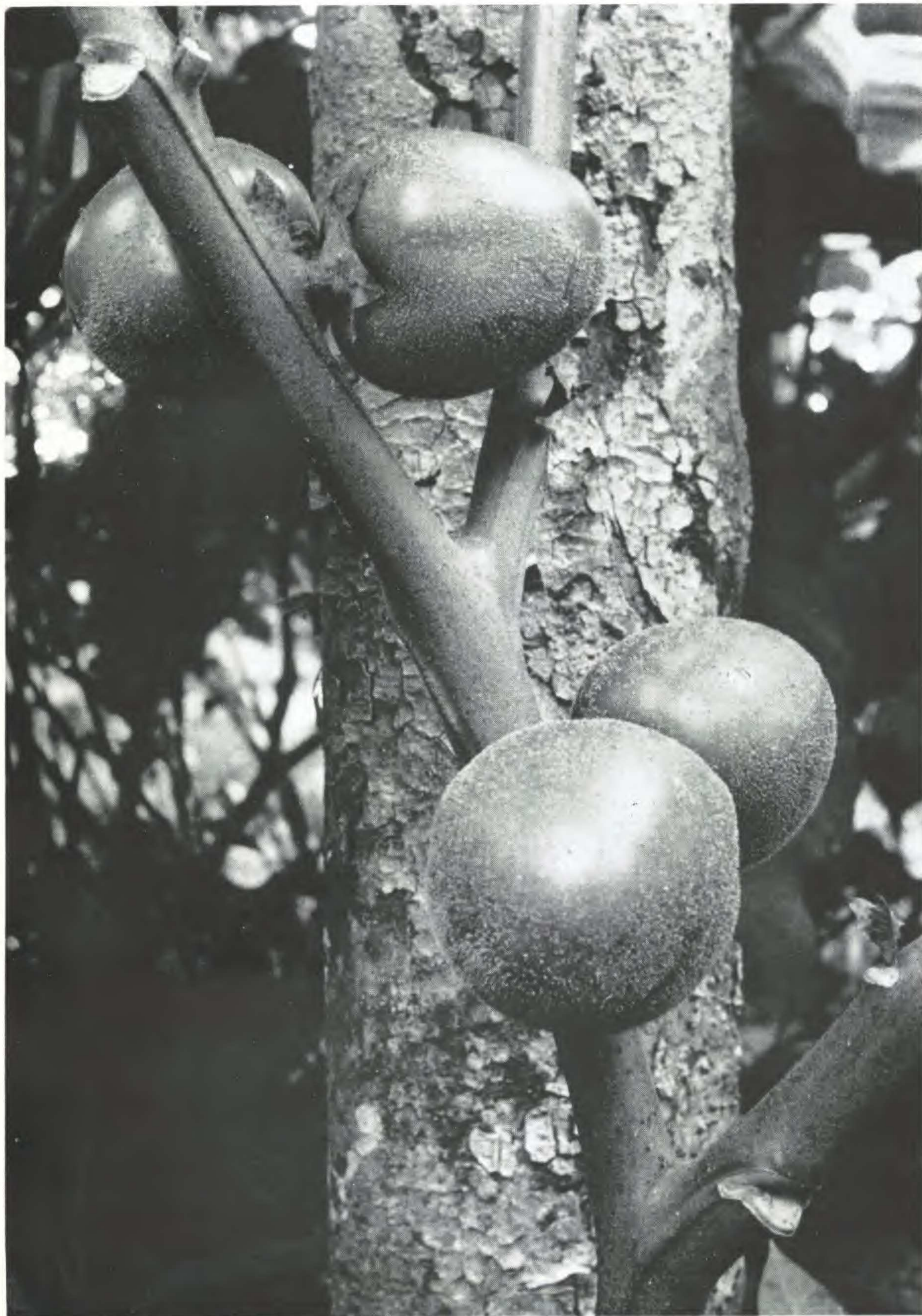


PLATE XLVI. *SOLANUM TOPIRO* *H. & B.* Fruiting branch of the plant from which *Schultes 12081* was collected. *Photograph by* RICHARD EVANS SCHULTES

(Río Kananarí)—*lě-tó*; Karijona (Río Caquetá)—*ho-moo-mé*; Kuripako (Río Guainía)—*ma-ré-da*; Makú (Río Piraparaná)—*bě-beñ*; Makuna (Río Apaporis)—*ma-rá*; Miraña (Río Caquetá)—*ró-ya*; Puinave (living on Río Apaporis)—*poom-ka*; Taninuka (Río Popeyacá)—*ba-rá*; Yukuna (Río Miritiparaná)—*po-ró-la*.

An examination of the major works on tropical fruit plants indicates that *Solanum Topiro* has been completely neglected and probably unknown as a cultigen. As Fennell (Fennell, J. L. "Cocona—a desirable new fruit" in For. Agric. 12 (1948) 181) has written: "To what extent, if any, the *cocona* [*Solano Topiro*] may have reached the gardens of the outside world is difficult to say. That it appears even now to be essentially unknown to horticulture leads me to believe, in light of its impressive appearance and apparent usefulness, that it may never have previously left its secluded habitat as a recognized fruit of value."

The first serious attention paid by botanists to *Solanum Topiro* as a cultigen dates from the middle of the 1940's. During this period, seeds of the plant were collected "from the little-explored reaches of the upper Amazon" (presumably in Peru) and established in the Experiment Station at Tingo María in Peru. Eventually, it was introduced to the Instituto Interamericano de Agricultura Tropical in Turrialba, Costa Rica, loc. cit.; Ochse, J. J. "*Solanum hyporhodium* or *cocona*" in Proc. Fla. State Hort. Soc. 66 (1953) 211), from which centre it began to attract horticultural attention.

The vernacular name for *Solanum Topiro* in Peru is reported to be *cocona*. This is borne out by notes on herbarium specimens (*Killip & Smith 27367, 27823*) collected in the Amazonian part of Peru in 1929. In the Putumayo region of Colombia, the plant has two vernacular names—*cocona* and, amongst the settlers recently arrived from

PLATE XLVII



PLATE XLVII. *SOLANUM TOPIRO* H. & B. Fruiting branches of the plant from which *Schultes 22571* was collected. Photograph by RICHARD EVANS SCHULTES

highland Colombia, *lulo*. The convenient epithet *cocona* followed the plant in its several introductions and has now, in the literature, been accepted as a standard common name. Unfortunately, however, *cocona* was erroneously identified and, in agricultural institutions as well as in the scientific and popular literature, was determined as representing *Solanum hyporhodium* A. Br. et Bouché. This error was corrected in 1958 (Schultes, R. E. : "A little known cultivated plant from northern South America" in Bot. Mus. Leaf. Harvard Univ. 18 (1958) 229–244).

Solanum Topiro has never apparently been collected from the wild, and we have never seen it outside of agricultural plots or abandoned house-sites which obviously had been the scene of cultivation. We probably have at hand in this plant a species so long in association with man that it may nowadays exist only because of this association. The fruit yields viable seeds in great abundance, but the plants seem to reproduce themselves only in highly disturbed and sunny sites.

The Indians eat the ripe fruit as a tomato. The civilized inhabitants of the region use the fresh fruits to prepare, with sugar, a rather acidulous, thirst-quenching drink. The plant is apparently never set out deliberately but springs up from seeds adhering to the rind when this is cast into refuse heaps or when inedible parts of the fruit are spat out in the process of eating. The species is grown over a wide area including much of forested eastern Peru, most of the Amazon drainage-area of Colombia, the upper reaches of the Orinoco system in Venezuela and probably to a much lesser extent adjacent parts of Brazil.

We gratefully acknowledge important help in bibliographic matters from Mrs. Julia Morton of the Morton Collectanea.